

Customer: ALPS EUROPE DISTRIBUTION

No. 12E2006-3023

Date: Nov. 06, 2006

Attention:

Your ref. No.:

Your Part No.: EC12E2420404

SPECIFICATIONS

ALPS' ;

MODEL: EC12E2420404

Spec. No.:

Sample No.: F 3 5 1 7 2 6 4 M

RECEIPT STATUS

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By Date

Signature

Name

Title

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B6523

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S P E C I F I C A T I O N S

1. THIS SPECIFICATIONS APPLY TO EC12E2420404 ROTARY ENCODERS.

2. CONTENTS OF THIS SPECIFICATIONS.

F3517264M

LE212

3. MARKING

- MARKING ON ALL UNITS
DATE CODE

• CAUTION

Regardless of the suggested applications of these products being introduced in the specifications, when using them for equipment and devices requiring a high degree of safety, respective manufacturers will please preserve safety of the planned equipment and devices by providing necessary protective circuits and redundancy circuits and reconfirm if safety is being duly preserved.

Products being introduced in the specifications have been designed and manufactured for applications to ordinary electronic equipment and devices such as the AV equipment, electric home appliances, office machines and communications equipment. Consequently, when employing these products for applications requiring a high degree of safety and reliability such as the medical equipment, aviation and aircraft equipment, space equipment and burglar alarm equipment, the using manufacturers will please thoroughly study the proprieties of these products for the planned applications.

Although we are exerting our best efforts to maintain the quality of these products, we cannot guarantee that they will never cause short circuiting and open circuitry. Therefore, when designing an equipment or device with which the priority is given to the safety, you will please carefully study the influences to the whole equipment of a single function failure of Potentiometers and Encoders in advance to make out a fail-safe design providing.

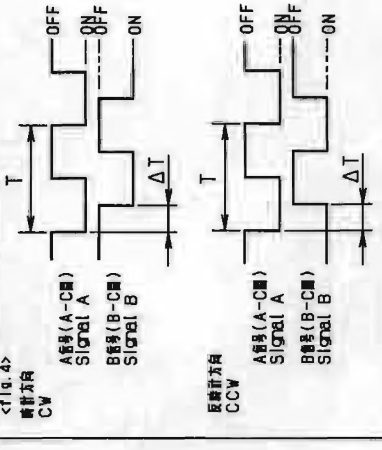
4. 電氣的特性 Electrical characteristics


項目 Item	条 Conditions	規格 Specifications
4-1 出力信号 Output signal format		<p>A, B 2 相の信号出力とし、両相は < Fig. 1 > の通りとする。</p> <p>A 相時は出力 OFF の文字位置にあること</p> <p>B 相時は出力 ON の文字位置にあること</p> <p>両相のクロック位置を示す。</p> <p>2 Phase-different signals (Signal A, signal B)</p> <p>The output position will always be aligned with A-phase but B-phase has no specific position condition. The phase output position is with A-phase type.</p> <p>< Fig. 1 ></p>
4-2 分解能 Resolution	<p>回転方向 Shaft rotational direction</p> <p>信号 Signal</p> <p>出力速度 Output</p>	<p>OFF</p> <p>ON</p> <p>OFF</p> <p>ON</p> <p>OFF</p> <p>ON</p> <p>OFF</p> <p>ON</p> <p>OFF</p> <p>ON</p> <p>注: 24パルス/360° 24 pulses/360° for each phase</p>
4-3 スイッチング特性 Switching characteristics	<p>1 回転で出力されるパルス数 Number of pulses in 360° rotation</p> <p>下記条件で < Fig. 2 > を参照。目標値は 360°・S⁻¹ の値より 10% 以上とする。</p> <p>Measurement shall be made under the condition as follows.</p> <p>1) Shaft rotational speed : 360°・S⁻¹</p> <p>2) Test circuit : < Fig. 2 ></p>	<p>< Fig. 2 ></p> <p>DC5V</p> <p>10kΩ</p> <p>10kΩ</p> <p>A 端子 Terminal A</p> <p>B 端子 Terminal B</p> <p>C 端子 Terminal C</p> <p>1/2 コード Encoder</p> <p>OFF</p> <p>3.5V</p> <p>1.5V</p> <p>ON</p> <p>t₁</p> <p>t₂</p> <p>t₃</p> <p>< Fig. 3 ></p> <p>注: コード ON 状態 : 出力電圧が 1.5V 以上の状態を言う。 コード OFF 状態 : 出力電圧が 3.5V 以上の状態を言う。</p> <p>(note) CODE-ON area : The area which the voltage is 1.5V or less CODE-OFF area : The area which the voltage is 3.5V or more.</p> <p>コードの OFF-ON 状態は OFF の状態。出力 1.5V ~ 3.5V の通過時間にて測定する。 Specified by the signal's passage time from 3.5V to 1.5V or from 1.5V to 3.5V of each switching position (code OFF → ON or ON → OFF).</p>

[illegible]

ALPS ELECTRIC CO., LTD.


APPD.	CHKD.	DSGD.	TITLE	12 形回転式エコーダ 1.1mm Size Rotary encoder
APR. 22, '99	APR. 22, '99	APR. 22, '99	DOCUMENT NO.	F3517264M (1/8)
K. ITO	Y. KANZAKI	H. MIURA		

項目 Item	条件 Conditions	規格 Specifications
2) 滑動ノイズ (バウンス) Sliding noise (Bounce)	コードONの時の1.5V以上の電圧変動時間とし、チャタリング、1.5V以上の電圧変動1ms以上の1.5V以上の電圧変動を有するものとする。また、電圧ノイズは1.5V以下の電圧変動1ms未満のものは、電圧ノイズと判断する。 Specified by the time of voltage change exceed 1.5V in code-ON area. When the bounce has code-ON time less than 1ms between chattering (t_1 or t_2), the voltage change shall be regarded as a part of chattering. When the code-ON time between 2 bounces is less than 1ms, they are regarded as 1 linked bounce.	$t_2 \leq 2ms$
3) 滑動ノイズ Sliding noise	コードOFF時の電圧変動 The voltage change in code-OFF area.	3.5V以上 3.5V MIN
4-4) 絶縁抵抗 Dielectric strength	端子-接地間A、C. 50V/1分間耐電圧、(リ-グ電圧1mA) A voltage of 50V A.C. shall be applied for 1min between individual terminals and bracket. (Leak current 1mA)	絶縁破壊のないこと。 Without arcing or breakdown.
4-5) 絶縁抵抗 Insulation resistance	端子-端子間B、C. 50V/1分間耐電圧。 Measurement shall be made under the condition which a voltage of 50V A.C. is applied between individual terminals and bracket.	端子-端子間耐電圧10MΩ以上 Between individual terminals and bracket: 10MΩ MIN
4-6) 位相差 Phase-difference	定速度動作動作を要する。 Measurement shall be made under the condition which the shaft is rotated in constant speed. <Fig. 4> 回転方向 CW A信号 (A-CM) Signal A B信号 (B-CM) Signal B 回転方向 CCW A信号 (A-CM) Signal A B信号 (B-CM) Signal B	 ΔT=0.08T 以上 MIN In<Fig. 4>

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APPRO.	CHKD.	DSGD.	TITLE
Apr. 22, '99	Apr. 22, '99	Apr. 22, '99	1.2 形回転エンコーダ
K. ITO			12mm Size Rotary Encoder
Y. KANZAKI			DOCUMENT NO.
F 3517264M			(3/8)

項目 Item	条件 Conditions	規格 Specifications
5-1 全回転角度 Total rotational angle		360° (エンドレス) 360° (Endless)
5-2 クリックトルク Detent torque	(クリック時のみ適用) (Applied for with-detent type)	3~20mN・m
5-3 クリック位置及び位置 Number and position of detents		24 detents (77.7°/1個 15°±3°) (Step angle: 15°±3°)
5-4 軸の押し引き強度 Push-pull strength of shaft	軸の押し引き及び方向に80Nの静荷重を10秒間加える。(PCB実装時) Push and pull static load of 80N shall be applied to the shaft in the axial direction for 10s. (After soldering of the PC board)	軸の腐食、歪み、変形、及びその他の損傷を生じないこと。 Without damage to or excessive play in shaft. No excessive abnormality in rotational feeling and electrical characteristics shall be satisfied.
5-5 端子強度 Terminal strength	端子強度の位置の一方に30Nの静荷重を10秒間加える。 A static load of 3N shall be applied to the tip of terminals for 10s in any direction.	歪み、及び端子の腐食を生じないこと。 Without excessive play in terminals or poor contact.
5-6 軸の揺れ Shaft wobble	軸先端から55mmの位置で50mN・mの静荷重を10秒間加える。 A momentary load of 50mN-m shall be applied at the point from the tip of the shaft in a direction perpendicular to the axis of shaft.	0.7xL/30mmp-D以内 0.7xL/30mmp-D MAX (Lは軸長さ、Dは軸径、(L: Shaft length))
5-7 軸の押し引き方向の軸方向の強度 Push and pull strength in axial direction	軸の押し引き方向に20Nの静荷重を10秒間加える。 Push and pull static load of 2N shall be applied to the shaft in the axial directions.	0.4mmp-D以内 0.4mmp-D MAX
5-8 軸の揺れ強度 Side thrust strength of shaft	軸先端から55mmの位置で20Nの静荷重を10秒間加える。(PCB実装時) A load of 20N shall be applied at the point from the tip of the shaft in a direction perpendicular to the axis of shaft. (After soldering of the PC board)	歪み、及び軸の腐食を生じないこと。 Without excessive play or bending in shaft. No mechanical abnormality.
5-9 軸の回転方向の揺れ Shaft play in rotational wobble	角度変化を測定する。 Measure with jig for rotational angle	3° 以内。 3° MAX

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K. ITO			12mm Size Rotary Encoder
Y. KANZAKI			DOCUMENT NO.
F 3517264M			(4/8)

項目 Item	条 Conditions	項 Specifications
5-10 溶接抵抗 Resistance to soldering heat	7条の“はんだ付け条件”による。 Specified by the clause 7 "Soldering conditions".	はんだ付け後、電気的性質を満足する こと。また、きずひび等機械的破壊 の恐れなく、 Electrical characteristics shall be satisfied. No mechanical abnormality such as a excessive play. 電解処理後、表面の95% 以上新しいはんだで覆われていること。 A new uniform coating of solder shall cover a minimum of 95% of the surface being immersed.

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DOCUMENT NO.	
F 3517264M	
(5/8)	

項目 Item	条 Conditions	項 Specifications
6-1 回転寿命性 Rotational life	振動で速く600~1000/Hの速度で、30,000回回転試験を行う。 The shaft of encoder shall be rotated to 30,000 cycles at a speed of 600~1000/H without electrical load, after which measurements shall be made.	チャタリング $t_v \leq 5ms$ バウンス $t_b \leq 3ms$ Chattering $t_c \leq 5ms$ Bounce $t_b \leq 3ms$ クラックが残っていること。 Detent feeling has to remains.
6-2 耐湿性 Damp heat	温度40±2°C、湿度90~95%の恒温湿槽中240±10時間放置後、常温、常湿中241.5時間 放置する。 The encoder shall be stored at a temperature of 40±2°C with relative humidity of 90% to 95% for 240±10H in a thermostatic chamber. And then the encoder shall be subjected to standard atmospheric conditions for 1.5H, after which measurement shall be made.	耐湿性(4.1~4.5及び5.1) を満足すること。 Specifications in clause 4.1~4.5 and 5.1 shall be satisfied.
6-3 耐乾熱性 Dry heat	温度85±3°Cの恒温槽中240±10時間放置後、常温、常湿中241.5時間放置する。 The encoder shall be stored at a temperature of 85±3°C for 240±10H in a thermostatic chamber. And then the encoder shall be subjected to standard atmospheric conditions for 1.5H, after which measurements shall be made.	
6-4 低温特性 Cold	温度-40±3°Cの恒温槽中240±10時間放置後、常温、常湿中241.5時間放置する。 The encoder shall be stored at a temperature of -40±3°C for 240±10H in a thermostatic chamber. And then the encoder shall be subjected to standard atmospheric conditions for 1.5H, after which measurement shall be made.	
6-5 耐落下性 Free falling	60cmの高さより製品の任意の方向からペンチ型を落しコンクリートの上に自由落下させる。 The encoder shall be fallen freely at any posture from 60cm height to the concrete floor covered with vinyl-tile, after which measurement shall be made.	著しいきず、破壊等がない(耐落下性) (4.1~4.5及び5.1)を 満足すること。 (8.1、端子部の保護を除く。) No excessive deformation of damage. (Except the deformation of terminals.) And specifications in clause 4.1~4.5 and 5.1 shall be satisfied.
6-6 耐振性 Vibration	10~55~10Hzと変化する振動(1mm/s、振幅1.5mm)をX、Y、Z、各方向 2時間加える。 The following vibration shall be applied to the encoder, after which measurement shall be made: The entire frequency range, from 10Hz to 55Hz and return to 10Hz, shall be transversed in 1 min. Amplitude(total excursion): 1.5mm. This motion shall be applied for a period of 2H in each of 3 mutually perpendicular axes (A total of 6H).	耐振性(4.1~4.5及び5.1) を満足すること。 Specifications in clause 4.1~4.5 and 5.1 shall be satisfied.

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APPD.	CHKD.
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F 3517264M	
(6/8)	

9. その他、取扱い上の注意 PRECAUTIONS IN USE

7. はんだ付け条件 Soldering conditions

7-1 手はんどの割合 MANUAL SOLDERING

温度350°C以下、時間3分以内	: 350°C or less.
Blt temperature of soldering iron	: within 3s.
Application time of soldering iron	

7-2 タイプBは、DIP soldering

電線板 : t1.6mm銅覆板
Printed wiring board: Single-sided copper clad laminate board with thickness of 1.6mm.

- Specific gravity: 0.82 or more.
- Flux shall be applied to the board using a bubble foaming type fluxer.
- The board shall be soaked in the flux bubble only to the middle of its thickness.
- Flux shall not come into contact with the component side surface.

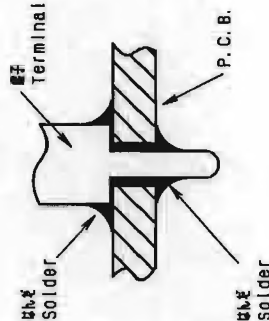
プリヒート：基板表面温度100°C以下、時間1分以内
Preheating:
・Surface temperature of board: 100°C or below
・Preheating time: within 1 min.

はんご : 温度 $260^{\circ}\text{C} \pm 5^{\circ}\text{C}$ 、時間 $3\text{秒} \pm 1\text{秒}$ 以内
 Soldering:
 ・Solder temperature: $260^{\circ}\text{C} \pm 5^{\circ}\text{C}$.
 ・Immersion time: within 3s

以上の工程を1回または2回繰り返す。
Apply the above soldering process for 1 or 2 times.

8. はんだ付け前の注意事項 Note for soldering method.

8-1 下図のようにP.C. 板の上面にのみ溶接する取組は、お断りください。
Please avoid soldering on upper surface (the component side surface) of the PC board as shown below



B-2 半田・トップ・部の処理についてはエングラ・一内2フラックスが実入する場合があります。
 性部は向の部因とありますのでご参照下さい。
 Please avoid cleaning of PCB board because the flux used during the dip soldering process may enter the encoder and cause poor contact

[illegible]

9-1. 保管は高温、多湿の場所及び腐食性力*ス中を避けて下さい。

During operation, storage in high temperature and humidity, and in corrosive gas, should be avoided.

9-2. エンコーダ・00ハ・ルスカウント処理の強註記においては動作スピード・、サンプリング・タイム、マスキング・タイム等と
 関連し、実装時間の上限値を用います。

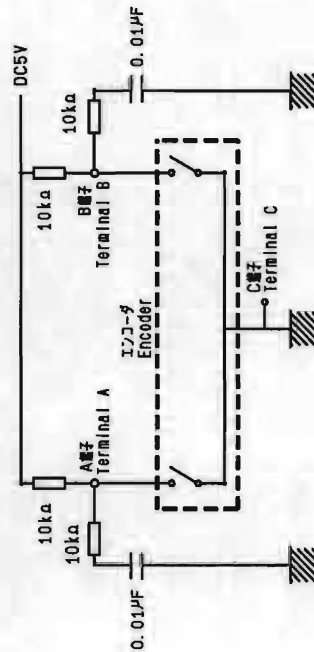
In case of pulse count process design, operational speed, sampling time, and masking time etc should be taken into the consideration.

9-3. 本製品はクリック位置にてA相はOFF状態で安定となりますので、ソフト設計時A相基準で設計願います。

A phase should be design criterion prior to 8 phase.
Because A phase has steady off signal at detent position.

9-4. インコーダ - のパルスカウンタ処理の回路は下図のフィルムターをいれることを推奨します。

For your pulse count design, it should be considered to add C/R filter on your circuit shown as below.



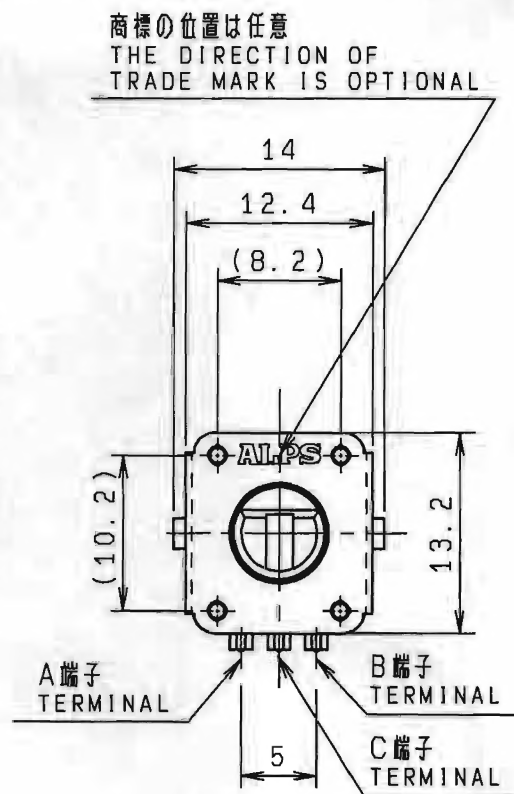
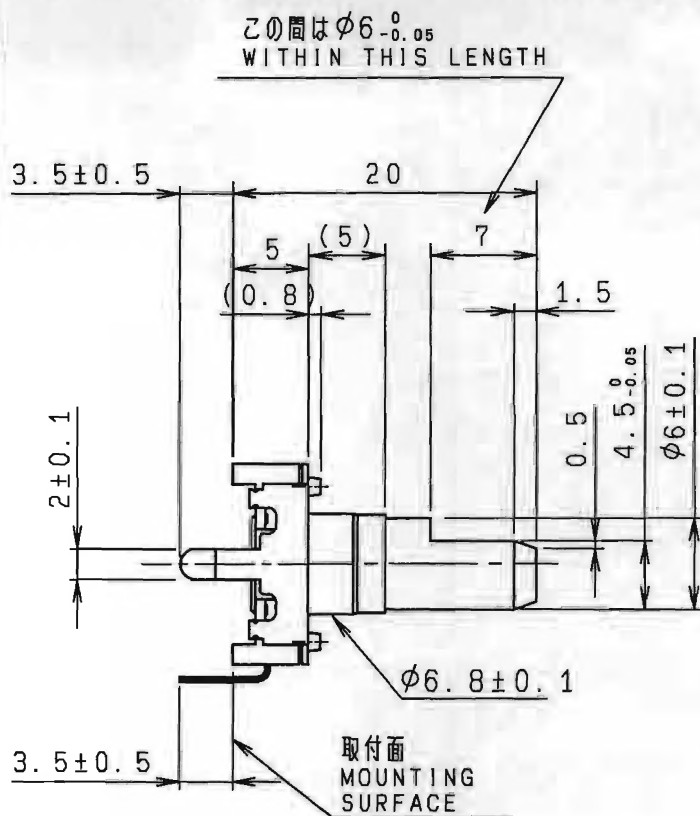
9-5. 本製品の本体に直接水が分かかりますと、ハ'も次第に異変が生ずる可能性がありますので、製品に直接水がつかないように配慮します。

Care must be taken not to expose this product to water or dew to prevent possible problem in pulse output wave form.

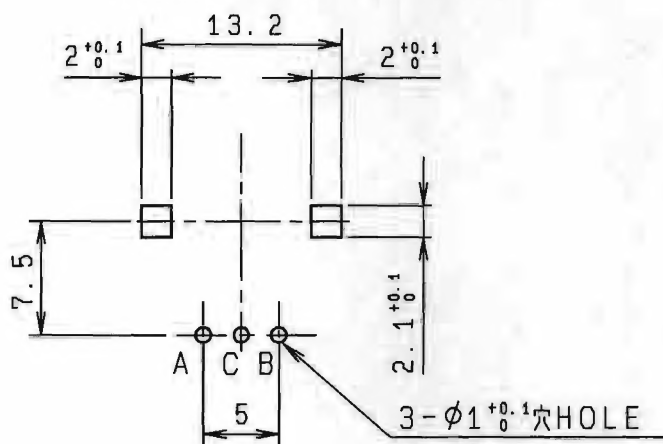
[illegible]

Please avoid to medical instrument because this encoder is audio use.

[illegible]

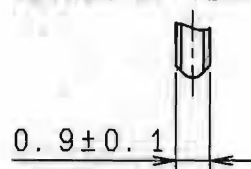


取付穴寸法図 (許容差 ± 0.1)
*挿入側より見た図
P.W.B. MOUNTING DETAIL
(TOLERANCE ± 0.1)
VIEWED FROM MOUNTING SIDE




基板板厚 $t = 1.6\text{mm}$
P.C.B.

端子先端詳細図 (10:1)
DETAIL OF TERMINALS



指定なき部分の許容差 TOLERANCES UNLESS OTHERWISE SPEC	
$L \leq 10$	± 0.3
$10 < L < 100$	± 0.5
$100 \leq L$	± 0.8
角度 ANGULAR DIMENSION	$\pm 5^\circ$

						24バルス SHAFT COLOR:BLACK		L=20 クリック付		伏形	
PART NO.		NAME		MATERIAL NAME / CODE				FINISH			
						ALPS ELECTRIC CO., LTD.					
						DSGD. セツケイ2 H. MIURA '95-12-08		SCALE 2 : 1			
						CHKD. M. ENDOU '95-12-08				TITLE 12形 薄形エンコーダー	
						APPD. S. MIZOBUTI '95-12-08		UNIT mm		DOCUMENT NO. LE212	
SYMB		DATE		APPD	CHKD	DSGD					

F3517264M